

CLAIMS

What is claimed is:

1. A clutch apparatus for performing two-phase position control for a two phase-positioned object installed on a shaft, the clutch apparatus comprising:
 - a clutch housing for rotating together with the shaft, while supporting the shaft;
 - a driving gear installed on the housing, for being rotatable and for selectively driving the housing in a rotatable manner with the help of a clutch intervened between the housing and the driving gear; and
 - a solenoid unit for supporting the housing and selectively on/off-controlled, wherein the housing has an initial position controlling protuberance interfered with the solenoid unit in its on-state, for determining an initial position of the object, and a pair of phase protuberances interfered with the solenoid unit in its off-state, for suppressing rotation of the housing at each of the two phase positions of the object.
2. The apparatus according to claim 1, wherein a pair of the phase protuberances is projected on an outer periphery of the housing, for corresponding to a position of a switch member in its off-state that is changed by on/off operation of the solenoid unit.
3. The apparatus according to claim 2, wherein a pair of the phase protuberances is positioned on the same circumference in an outer periphery of the housing.
4. The apparatus according to claim 2, wherein the phase protuberances are installed symmetrically with respect to the shaft.
5. The apparatus according to claim 1, wherein the initial position controlling protuberance is prepared on a position that forms an angle of 90 degrees in a circumferential direction with respect to each of the phase protuberances.
6. The apparatus according to claim 1, wherein interference between the solenoid unit and either of a pair of the phase protuberances is released by instant on/off-operation of the solenoid unit so that phase conversion may be possible.
7. A position control clutch device comprising:

a driving gear and clutch connectable for rotation with a housing;
a shaft connectable for rotation with the housing at one end and having an object at the opposite end; and
a solenoid unit adapted to rotatably support the housing and for selectively engaging protuberances on the surface of the housing with a switch member, wherein the switch member engages an initial position controlling protuberance when the solenoid unit is in an on state and the switch member selectively engages either a first phase protuberance or a second phase protuberance when the solenoid is in an off state, whereby the position of the object is controlled in set phases by turning the solenoid on and off.

8. A position control clutch device as in claim 7, wherein the first phase protuberance and the second phase protuberance are on opposing sides of the housing surface.

9. A position control clutch device as in claim 7, wherein the initial position controlling protuberance is disposed on a circumference offset from the first and second phase protuberances.

10. A position control clutch device as in claim 7, wherein the object comprises a cam.

11. A position control clutch device comprising:
a housing rotatably coupled to a shaft, wherein the shaft has a cam at a free end in common rotation with the shaft;
a driving gear and clutch connectable for selective rotation with the housing;
a solenoid unit adapted to rotatably support the housing and for selectively engaging the housing with a switch member;
wherein the switch member selectively engages an initial position controlling protuberance on the surface of the housing when the solenoid unit is on, and a first phase protuberance or a second phase protuberance on the surface of the housing when the solenoid is off, and wherein the cam may change phase by cycling the solenoid on and off.

12. A position control clutch device as in claim 11, wherein the first phase protuberance and the second phase protuberance are on the same circumference line on opposite sides of the housing surface.

13. A position control clutch device as in claim 11, wherein the initial position controlling protuberance is disposed on a circumference line that is offset from the circumference line of the first and second phase protuberances.

14. A position control clutch device as in claim 11, wherein the driving gear and clutch slip and do not provide rotational force to the housing when the switch member engages a protuberance on the housing.